U.S. STRATEGIC NUCLEAR FORCE OPTIONS

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AUTHOR:

Collins, John M.

Senior Specialist in International Affairs (National Defense)

Severns, Elizabeth Ann

Research Assistant, Office of Senior Specialists

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ISSUE DEFINITION

Ample security at acceptable cost is the aim of U.S. strategic retaliatory forces, which are assigned primary responsibility for deterring atomic attacks against the United States. That aim stays constant, but essential force requirements do not. Nuclear systems needed in one context are surplus in others.

Congress, in reviewing proposals, therefore needs some effective way to relate retaliatory force requirements with U.S. deterrent strategy before it can accurately assess the adequacy of present and projected postures.

This brief, which provides no definitive "answers" and supports no special position, addresses three connected issues:

-- How many U.S. weapon systems are compulsory?

-- Which combination would be most suitable?

-- What force level for each system would serve best?

Assessments stress fundamental differences between functional classes. Bombers accomplish strategic nuclear missions in ways completely foreign to intercontinental ballistic missiles (ICBMs), which duplicate few strengths and weaknesses of submarine-launched counterparts (SLBMs), and so on. Improved products within each class perform missions better than predecessors, but in much the same way. Piston-powered aircraft and jets, for example, both fly from point A to point B. It is fruitless, therefore, to argue about relative merits of B-1 bombers and MX missiles before the need for any bomber or ICBM has been established. Particular makes and models are mentioned only for exemplary purposes.

NOTE: Tables that support this text are not retrievable on the CRT, but may be obtained by requesting hard copies.

BACKGROUND AND POLICY ANALYSIS

HOW MANY U.S. SYSTEMS?

The United States, committed to a second-strike strategy, requires retaliatory arms that could accomplish assigned missions after absorbing a large-scale attack. In addition, the force should afford flexibility, and forestall technological surprise.

Manned bombers fulfilled those functions until the late 1950s. The Defense Department deployed fixed-site ICBMs in 1959 for a variety of reasons. A triad developed the following year, when Polaris submarines first went to sea. It is important to note, however, that strategic requirements did not dominate decisions to construct a triad. Service politics shaped the structure as much as military missions.

How many systems are really mandatory?

Most students of the subject agree that no monad, however impressive, could fill the bill for long under fast-changing conditions.

Two systems theoretically could suffice, if pre-launch survivability and penetration prospects of both were superlative. Soviet power, for example, still depends primarily on two types of ballistic missile, even though Backfire bombers have assumed a significant role. U.S. second-strike constraints, however, create doubts that any two U.S. systems deployed or under development could safely underpin long-term security, as the next section indicates.

Three systems have served well for the last two decades, but present proclivities are to reinforce, not reduce, our traditional triad. Seven prospects have been tested to some extent. Air- and submarine-launched cruise missiles (ALCMs, SLCMs), together with semi-mobile ICBMs (SM ICBMs), are under active consideration at this time. Freely mobile ICBMs (FM ICBMs), air-launched ballistic missiles (ALBMs), ballistic missiles fired from surface ships (SSBMs), and Hydra are waiting in the wings. Shallow Underwater Missiles (SUM) on coastal submarines, sometimes called the Shallow Undersea Mobile Force, differ in detail from deep water SLBMs, but not enough to define a discrete functional category. Airmobile missiles on aircraft that land before launch are lumped with ALBMs.

The Department of Defense considers all experimental systems as possible supplements to, rather than replacements for, present components. There is no proof, however, that additions would provide a more cost-effective deterrent force than three dependable components, which have been sufficient so far, The Law of Diminishing Returns would cause the value of dollar investments to decline with each new layer, diverting funds unnecessarily from other defense and domestic programs, unless budgets were given big boosts.

Plans to expand the U.S. triad to four or more systems seem difficult to support when put in that context.

WHAT SYSTEMS IN COMBINATION?

What change, if any, in the present mix would serve America's needs most completely is more a matter of portents than present capabilities.

CURRENT TRIAD CONNECTED WITH TRENDS

The existing U.S. triad seems temporarily sound. Complicated scheduling problems make it almost impossible for any foe to compromise SAC bombers and silo-based ICBMs simultaneously. Soviet anti-submarine warfare (ASW) capabilities are so slim at this stage that U.S. submarines on station at sea would escape largely unscathed.

U.S. retaliatory forces, once committed, seem to have strengths needed to accomplish essential missions.

Ballistic missile warheads would be "home free." The few primitive

defenses they face could be quickly overcome. U.S. bombers would have to breach the world's most sophisticated and comprehensive air defenses, which are deployed in great depth, but planners are confident that about 75% of our B-52s would reach their targets.

Projected Soviet capabilities, however, suggest that U.S. deterrent powers predicated on the present triad may be perishable.

The Soviets already have more than four times as many ICBM warheads as SAC has missile silos, which are static targets. Most of Moscow's weapons are in the megaton range. Power and precision are being improved. Emerging hard target capabilities consequently make the security of U.S. fixed-site ICBMs an increasingly serious source of concern, since they are undefended.

B-52 bombers, along with supporting tankers, depend in part on dispersion to ensure pre-launch survival, but runway and parking restrictions limit the choice of airstrips. Soviet SLBMs mounting MIRVs, which numbered 192 tubes in January 1981, could cover dispersal sites and saturate escape routes much more effectively than single-shot missiles, if they choose to shoot from short range. Moreover, intelligence analysts indicate that Soviet air and civil defenses could deny many crucial targets to U.S. manned penetrators (especially B-52s) during this decade.

Straight-line projections of those trends could cause U.S. deterrence in the mid-1980s to depend mainly on a monad of SLBMs, whose survivability could be significantly degraded by Soviet ASW or ABM breakthroughs that are not expected but not impossible. Some corrective steps already are underway, but a structured approach to posture improvement still is worth reviewing.

OPTIONAL ALTERATIONS OF THE TRIAD

Exclusive reliance on systems with similar characteristics, however strong, would reduce U.S. security, not strengthen it. The pre-launch survival prospects of air-launched cruise missiles and ALBMs are similar to those of manned bombers. SLBMs (including SUM) and sub-launched SLCMs would be endangered by a Soviet ASW breakthrough. An effective Soviet ABM shield would drastically reduce deterrent properties of any ballistic missile. Diversification thus is in demand, but only within loosely defined limits. No rule, for example, states that land-, sea-, or air-launched systems all must be represented. Two of the three triad legs could be aloft, ashore, or afloat if the resultant combination satisfied U.S. security requirements more completely than any other amalgam.

Which weapon systems would best satisfy U.S. force requirements depends on survivability, performance, and total program costs of the complete package. High-priced manpower and scarce energy supplies should be taken into account. No solution would seem acceptable if it risked great instability or an all-out arms race.

Ten systems that could fit into our triad are prospective competitors. Readers should be aware that one salient strength may outweigh many weaknesses, and vice versa. Calculations invariably involve subjective values. Every combination suffers some shortcomings. The goal is a suitable compromise.

The selection process would be the same if two, three, four, or more systems were to fit in the final structure.

One hundred twenty triads, for example, are mathematically possible, with 10 systems to choose from (see Table I). Almost 90% exhibit distinctly undesirable traits:

-- Twenty-nine sets overstress "airbreathing" systems.

-- Thirty-five contain nothing but ballistic missiles.

-- Nine put too many eggs in the land-based basket.

-- Six rely too much on submarine-launched missiles.

-- Nineteen change the current triad completely.

-- Nine include "sitting duck" ICBMs in silos.

The remaining 13 possibilities are somewhat more attractive. All mingle two classes of ballistic missile with a single "air-breather." Eight incorporate one airmobile component, with others aloft or afloat. All depend on mobility and/or deception to preserve pre-launch survival prospects.

Every one of those 13 options, however, involves tough tradeoffs:

-- Four sets embrace semi-mobile ICBMs, which attract the attention of Soviet marksmen to known aiming points in the Continental United States (CONUS).

-- Four more with freely mobile ICBMs also present targets on the American land mass.

-- Four of those eight possibilities abandon SLBMs, the most survivable system presently deployed.

-- The final five, which feature two dissimilar sea-launched systems, lack complete diversity, because they dispense with any land-based model.

U.S. decisionmakers therefore must compare relative merits of various combinations to ascertain the most suitable mix.

SLBMs As the Constant Component

All options selected for serious study probably should preserve SLBMs, which are vulnerable in port, but survivable on station. That stable system discourages enemy proclivities to preempt. If armed conflict should develop, despite our deterrent, SLBMs would draw few nuclear fires on the United States. U.S. responses, triggered at times of our choice, would presently be unsuppressible. Counterforce target coverage could be expanded by installing warheads with improved accuracies and yields, if U.S. decisionmakers desired.

Those strengths will remain unshaken until enemy ASW forces acquire high confidence that they can locate most U.S. strategic submarines at sea and

sink them simultaneously before they launch their missiles, or until Soviet ABMs can stop U.S. warheads enroute.

Replace Fixed-Site ICBMs

The reduced deterrent value of U.S. fixed-site ICBMs declines at a rate that relates directly to the rapid deployment of Soviet counterparts with credible hard target capabilities. That process cannot be impeded effectively for long by improving any second-strike system installed in silos.

Silo hardness already is approaching its practical limitation. Even new bases in bedrock, prepared at prodigious price, could be destroyed by big enough blasts. Expanding the force would be fruitless, for the Soviets could add warheads much faster than we could build silos and fill them with missiles, at a fraction of the cost. Replacing Minuteman missiles with MX would merely provide Soviet marksmen with more lucrative targets. Launch-on-warning policies (sometimes called launch-under-confirmed-attack) could strengthen deterrence by increasing uncertainty in the Soviet camp, but could be prudently implemented only if the Kremlin promised to leave the U.S. alert apparatus intact. Otherwise, our President, lacking proper input, might opt for a response completely out of proportion to the provocation, with ruinous results.

The long-term utility of fixed-site systems might be extended by early deployment of ballistic missile defense, but the SALT I ABM Treaty allows just 100 launchers, and suitable technology is still immature. Such a small force would leave eight of our nine ICBM fields uncovered. Many political and economic impediments oppose rescinding that pact, if Moscow refused to renegotiate.

Pressures to supplement or partly supplant our silo-based force thus are powerful. Four options perhaps should take top priority (sequence numbers 108, 112, 116, and 117 from the smorgasbord of possibilities in Table I). Each changes a single constituent in the current U.S. triad:

SM ICBM	FM ICBM	SSBM	Hydra
SLBM	SLBM	SLBM	SLBM
Bomber	Bomber	Bomber	Bomber

Option 1: Substitute Semi-Mobile ICBMs

Semi-mobile ICBM systems (SM ICBMs) constitute large-scale "shell games." Each MX transport, according to some current concepts, could rotate randomly among 23 reinforced structures along a linear route or closed loop "racetrack" 15-20 miles long, then dash to a new destination at the last moment. Other basing modes might include covered trenches, hardened open trenches, pinwheels, and multiple vertical structures, to cite a few samples.

SM ICBMs, however, compromise between hardness and mobility.

Maneuverability is strictly limited and associated shelters are less protective than silos. The system is more survivable than its fixed-site forerunner only if true target locations remain secret and the number of shelters exceed the Soviet stock of weapons with sufficient lethality. SM ICBMs could therefore be smothered by a first strike, unless some sort of SALT ceiling controls the quantity of large Soviet launchers and the legal load of independently targetable warheads per missile to such an extent that U.S. shelters exceed the stock of sufficiently lethal weapons the Soviets could allocate to destroy them. Failing that, U.S. semi-mobile missile deployments would have to be expanded far beyond present contemplation, be defended, or both.

In any event, the proliferation of known aiming points on American soil could invite saturation attacks of much greater magnitude than the Soviets would now need to swamp our 1,054 silos if deterrence failed for any reason. Critics also complain about construction costs and completion times, plus societal and environmental implications.

Option 2: Substitute Freely Mobile ICBMs

Freely mobile ICBM systems (FM ICBMs) mounted on trucks, trains, tracked vehicles, ground effects machines, river barges, and even lake-based submarines are essentially separate from semi-mobile models in one important military respect: they eliminate a known number of precisely located targets for enemy marksmen to hit. Backers believe that even a very large Soviet force would lack ample means to cripple the freely mobile land-launched leg of our triad with a full-scale assault, unless equipped with supersensitive surveillance devices and "smart" weapons that lock onto moving objects. Acquisition costs are cheap compared with semi-mobile models (although operating costs are more expensive).

FM ICBMs, however, are saddled with shortfalls of their own. Barrages of enemy MIRVs might blanket suspected hiding places in the United States. Protection against sabotage would pose special problems for missiles in the open, either stopped or in transit. Political opposition to nuclear weapons roaming public roads and rail lines is particularly strong. Arms controllers lament inabilities to verify how many mobile launchers are deployed.

Option 3: Substitute Surface Ship Ballistic Missiles

Some strategists prefer to remove as many targets as possible from the American land mass. One school therefore suggests that surface ship ballistic missiles (SSBMs) would make better replacements for fixed-site ICBMs than any semi-mobile or freely mobile land-based model, although SALT II as presently prescribed prohibits this option.

The concept calls for transport ship hulls to be modified as special purpose launch platforms. Tests with Polaris SLBMs proved practical in the early 1960s. Such vessels could fool satellite sensors, but not close visual verification. Prelaunch survival would depend primarily on mingling missile carriers with legitimate merchantmen on crowded shipping lanes. It would be easier to pick up the trail of surface ships than submarines when they leave port, and easier to track them thereafter, but crisscrossing paths and decoys still would make it difficult to differentiate false leads from true targets. Even if all could be detected at any given time, the Soviets still would be taxed to attack the total SSBM fleet simultaneously, together with two other

legs of our triad. U.S. National Command Authorities could maintain radio contact with SSBMs and transmit emergency orders more surely than with submerged submarines.

Option 4: Substitute Hydra

Hydra is the most revolutionary sea-launched missile system. Submarines (including SUM) and/or surface ships in any combination desired mount ballistic missiles internally or externally, either in canisters or modified to waterproof and improve bare missile buoyancy. Crews release those packets to float free in times of crises, far from the carriers and each other. Firings are triggered on call from remote positions at sea or ashore. All components could be recovered if threats recede and requirements to launch disappear, according to the concept, which Navy personnel tested in part in the early 1960s.

Hydra missiles theoretically could be affixed to all sorts of carriers with collateral functions (some ships, for example, might also transport cargo). Serious conflicts between main and secondary missions, however, would likely occur. Special purpose platforms, purchased at increased cost, would be more appropriate.

Releasing weapons in response to strategic warning would violate present nuclear safety regulations. That act also could catalyze Soviet strikes instead of reducing tension. Hostile surveillance ships might find and confiscate or destroy free-floating U.S. missiles, unless steps were taken to prevent detection.

Such problems seem solvable, but some champions of the Hydra system prefer tighter control. Their alternative concept calls for spontaneous launch to start as soon as missiles hit the water. Hydra in such case would lose its unique prelaunch survival properties. Costs, however, would still be less and carrying capacities greater than for submarines and surface ships designed to launch ballistic missiles from batteries on board.

Option 5: Substitute SUM

A fifth option, which does not show on Table I, considers Shallow Underwater Missiles (SUM) on small coastal submarines as possible replacements for fixed-site ICBMs.

The original intent was to operate SUM from submerged positions on the U.S. continental shelf, where submarines might even remain motionless on the bottom for prolonged periods. Communication links would be simple. Soviet seekers would find it difficult to separate true signals from background clutter close to U.S. shores.

That concept, however, proved impractical, since SUM vessels apparently would be vulnerable to the Van Dorn effect. A single Soviet nuclear weapon detonated in deep water near our continental shelf would sweep the shallows for 100-200 miles with waves perhaps exceeding 100 feet in height. Even a few such blasts would be ruinous. SUM, confronted with those conditions, must move to deeper patrol stations that reduce many of its advantages. Bottom-sitting, for example, is not possible on steep continental slopes or at sites submerged much more than 1,000 feet. The fact that SUM remains within range of shore-based ASW support is not directly important. The U.S.

Navy exerts no control over international waters in peacetime, and thus would be in poor position to protect SUM prior to a Soviet first strike. At best, Soviet ASW concentrations near the United States would ring alarm bells and allow our retaliatory forces to improve their routine readiness posture.

SUM and deep water SLBMs consequently compete for primacy within a single functional class, just as one of many basing modes would best serve mobile ICBMs. The integrity of our triad would remain intact if one sub-launched ballistic missile system replaced the other, but switching missiles in silos for SUM, while sticking, say, with Trident, would create a strategic nuclear dyad instead of strengthening a three-legged structure.

Replace Bombers with ALCMs

Bombers are advertised as the most flexible of all strategic delivery systems. They can satisfy requirements across the conflict spectrum, from shows of force to nuclear combat. They can function as manned penetrators carrying diversified payloads, or as standoff missile carriers. Heavy bombers also have the hypothetical ability to engage a series of widely-separated targets; to locate, track and destroy moving objects; and to crack the hardest known structures. Crews can assess post-strike damage and enemy activities (such as the rapid reloading of missile launch facilities), then take action on their own or recommend responses to responsible headquarters.

On examination, however, at least two of those claims seem extravagant.

Time-sensitive hard targets, for instance, are mainly immune to attacks by the fastest bombers, whose reflexes simply are too slow to engage enemy alert forces. The competence of aircraft to strike several successive targets with bombs is also dubious -- survival prospects could drop sharply when intruders proceed from one heavily defended objective to another, despite "black box" support and defense supression support from other triad components.

Converting sophisticated strategic aircraft for tactical roles in regional combat, however brief, does not bolster nuclear deterrence. On the contrary, committing them to secondary missions can detract. As a result of B-52 drawdowns during operations in Southeast Asia, the size of the SAC alert force slumped by 15%. Capabilities of a smaller force would be degraded even further, and combat losses like those SAC suffered over the Red River Delta in December 1972 could prove unsupportable. (The original B-1 buy was to be just 244 aircraft).

In short, heavy bombers seem less attractive tactically than advocates assert, and are rather rigid strategically, being better suited for "assured destruction" purposes than for countersilo options.

Beyond that, the deterrent value of U.S. strategic nuclear bombers continues to decline at a rate inversely proportionate to the age of our B-52s, which already are older than most of their crews. Modernization, however, faces no insurmountable impediments. Replacing B-52s with B-1s or some advanced system that incorporates "Stealth" technology would reduce dangers to U.S. bombers. Pre-launch survivability would improve because alert aircraft not only could "scramble" more quickly, but could disperse to many strips with short runways. (Tankers, however, will be denied that advantage until superior substitutes for KC-135s deploy in strength). Faster

speeds and better "black box" support should also make it possible to breach Soviet air defenses that could defeat B-52s.

A key question, therefore, follows: Would it be cost-effective to refurbish SAC's bomber force to foster better capabilities within its rather restricted scope, or would some other airbreathing system be more satisfactory?

There is no way to accommodate SLCMs or ALBMs without accepting structural defects, such as excessive stress on submarine-launched systems, total reliance on ballistic missiles, or adopting a quadrad at extra expense.

Four options therefore seem to take top priority, if decisions are made to switch (sequence numbers 111, 115, 118, and 119 in Table I). They are the same as Options 1-4 already discussed, but change two legs of the triad instead of one by substituting air-launched cruise missiles for manned bombers:

SM ICBM	FM ICBM	SSBM	Hydra
SLBM	SLBM	SLBM	SLBM
ALCM	ALCM	ALCM	ALCM

Pre-launch survival problems for ALCM carriers are similar to those of strategic bombers. They could be launched on warning in the same way, under positive control, subject to recall if required. Wide-bodied transports are less responsive than high-performance aircraft, because they need more time to taxi and take off. Vertical/short take-off and landing (V/STOL) characteristics would alleviate that problem, but lift capabilities are limited.

Once aloft, security would improve temporarily. Opponents, however, almost certainly would hope to destroy U.S. carriers before the crews could launch any missiles. Otherwise, anti-aircraft units would have to hit a horde of separate projectiles, instead of one compact target. Barrage attacks against flight corridors over U.S. soil could be expected.

Cruise missiles are less adaptable than manned aircraft. Range restrictions are set in concrete, since in-flight refueling is impossible (although auxiliary tanks can be mounted in some cases). Once a current generation missile has been fired, it can neither be recalled nor recovered.

After separating from delivery vehicles, cruise missiles depend heavily on compact radar cross-sections, low infrared signatures, and terrain-hugging capabilities to assist in breaching defenses. They currently lack active penetration aids and elaborate electronic countermeasure (ECM) packets, are unable to take evasive action, and cannot cope with contingencies. Supersonic speeds would help, but U.S. systems now in development are subsonic. Low, slow approaches, however, encourage accuracies that as yet are unattainable by ballistic missiles. An inertial guidance system, periodically updated enroute, can reduce errors to a few feet. If the missiles are fitted with warheads of sufficient yield, they can crush very hard structures, but most time-sensitive and mobile targets could avoid destruction.

Aside from the launch platforms, ALCMs come at "cut-rate" prices, compared

with other systems. Their greatest strength, therefore, might be realized by deploying sufficient numbers to overload opposing defenses. Electing to deploy ALCMs instead of manned penetrating bombers, however, would swap a proven system for new technology that still contains "bugs."

WHAT U.S. FORCE LEVELS?

Successive Secretaries of Defense concede that none of the triad's legs need to stand alone. Cumulative capabilities should simply be sufficient to withstand a strong attack, then retaliate effectively in ways that serve U.S. interests.

U.S. triad contingents were installed in the 1960s to support a countervalue strategy called "assured destruction". The main mission then was merely to cover 200-odd urban targets with a high degree of confidence, after accounting for aborts, attrition, and delivery errors that could reduce U.S. retaliatory capabilities. Defense Secretary McNamara, the principal architect, assumed that resources able to eradicate "say, one-fifth to one-fourth of the Soviet population and one-half of Soviet industrial capacity would serve as an effective deterrent."

One thousand Minutemen, each with a single warhead, were deployed to suit that purpose. Force levels for SLBMs, which act as complements, were never calculated as objectively. The original request for 45 submarines with 720 missiles was arbitrarily cut to 41 boats (total 656 tubes, each containing a one-warhead missile) without any apparent abridgement of essential capabilities. More than 600 B-52 bombers were assigned to SAC.

Soviet power since that time has increased immensely in absolute and relative terms, reducing pre-launch survival and penetration prospects for parts of our triad. U.S. strategy, which now stresses a range of nuclear options in addition to "assured destruction", calls for far greater firepower.

America's ICBM and SLBM launcher levels, however, have stayed static since 1967. The latter recently dropped from 656 tubes to 576, because two Polaris boats are being decommissioned and three more are being converted to attack submarines. SLBM strengths will not increase until the first Trident class submarine deploys late in 1981 or early in 1982. Heavy bomber holdings are scarcely half their peak strength.

Many ballistic missiles now are MIRVed (550 Minuteman IIIs, normally with three warheads apiece; 496 Poseidon and Trident I SLBMs, which average 10). B-52s carry bigger loads. Even so, target coverage reportedly falls short of requirements established by Presidential Directive 59 (PD 59).

How well ends and means really match could be ascertained only by comparing survivable force levels with classified target lists, which is beyond the scope of this brief. Suffice it to say that the necessary number of U.S. delivery vehicles and nuclear weapons could be calculated for each leg of our triad with much greater objectivity than previously, whether systems and Soviet threats remain constant or change. Accurate counts are critical, because shortages undercut U.S. security and excesses fritter away funds.

TENTATIVE FINDINGS

There is no way to identify the vices and virtues of systems such as Minuteman versus MX, Trident versus Poseidon, or B-52s versus B-1 without analyzing combinations in context with specific system characteristics, hard cost data, authoritative threat estimations, target distribution by number and type, and arms control goals. Third party threats, civil defense, air defense, ABM, and ASW all should be considered.

A few tentative findings nevertheless emerge.

Any forthcoming U.S. force posture not accompanied by convincing justification should be viewed with caution if it plans to:

-- Expand or contract the U.S. triad by adding or substracting systems.

-- Expand existing force levels.

-- Contain two or more land-, air-, or submarine-launched systems.

-- Contain two or more airbreathing systems.

-- Exclude airbreathing systems.

-- Retain fixed-site ICBMs.

-- Include undefended semi-mobile ICBMs, unless SALT limits Soviet warheads sufficiently.

-- Replace all three components in our present triad.

Decisionmakers also would do well to balance benefits against liabilities before approving any option that retains part of a present system after the rest is replaced (such as a mix of manned penetrating bombers with ALCMs or fixed-site with mobile ICBMs).

LEGISLATION

P.L. 97-39, S. 694

Department of Defense Supplemental Authorization Act, 1981. Authorizes the appropriation of additional funds for FY81 for the use of the armed forces for procurement of aircraft, missiles, naval vessels, tracked combat vehicles and for research, development, test, and evaluation. Increases the active duty personnel and strengths of the Navy, Marine Corps, and Air Force. Increases the number of reserve component members authorized to serve on full-time duty with the Marine Corps Reserve. Increases the number of civilian personnel authorized for the Department of Defense. H.R. 2614 introduced Mar. 18, 1981; referred to the Committee on Armed Services.

Reported to the House (H.Rept. 97-20), with amendment, Apr. 9. S. 694 introduced Mar. 12, 1981; referred to the Committee on Armed Services. Reported to the Senate (S.Rept. 97-35), with amendment, Apr. 1. Passed Senate, amended, May 7, 1981. Passed the House, amended, June 23, in lieu of H.R. 2614. Conferences held; conference report filed in the House (H.Rept. 97-204) July 27, to which both Houses agreed. Signed into law Aug. 14, 1981.

P.L. 97-86, S. 815

Department of Defense Authorization Act, 1982. Authorizes appropriations for the armed forces for procurement of aircraft, missiles, naval vessels, tracked combat vehicles, torpedoes, and other weapons, for research, development, test, and evaluation, and for operation and maintenance. Prescribes authorized end strengths for active duty, reserve, and civilian personnel. H.R. 2970 introduced Apr. 1, 1981; referred to the Committee on Armed Services. Clean bill H.R. 3519 reported to the House (H.Rept. 97-71, part 1), with amendment, May 12. Referred to the Committees on the Judiciary and on Government Operations. introduced Mar. 26, 1981; referred to the Committee on Armed Services. Reported to the Senate (S.Rept. 97-58), with amendment, May 6. Called up by unanimous consent in Senate; passed the Senate, amended, May 14, 1981. Passed the House, amended, July 16, in lieu of H.R. 3519. Conferences held. Conference report filed in the House (H.Rept. 97-311) Nov. 3, to which both Houses agreed. Signed into law Dec. 1, 1981.

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CHRONOLOGY OF EVENTS

10/29/81 -- The Department of Defense attacked CIA testimony that B-52s will have the capability to penetrate Soviet defenses almost as well as the B-1. DOD accused the CIA of testifying without knowledge of major changes that have been planned for the B-1.

10/28/81 -- The CIA testified that existing B-52s will be able to penetrate Soviet air defenses until 1990, according to Senator Ted Stevens, thus contradicting the Administration's argument for the B-1. Senator Stevens said the B-1 is "really nothing more than a hedge" until Stealth is in production.

10/16/81 -- Northrop Corp. has been awarded the prime contract for Stealth technology research and development. It is estimated that the new strategic bomber, which allegedly will absorb radar rather than reflect it and thus elude Soviet air defenses, will be operational in the early 1990s.

10/07/81 -- Chairman Price of the House Armed Services Committee denounced President Reagan's plan to place MX in

existing Titan silos. In hearings before that Committee, Price stated, "No evidence available to date indicates that hardening a limited number of silos will provide any significant added survivability in the face of the increasing accuracy of Soviet strategic missiles."

10/06/81 -- General Jones, Chairman of the Joint Chiefs of Staff, would not endorse the Administration's plan for basing the MX in testimony before the Senate Armed Services Committee, and again expressed his support for the "shell game" plan proposed by President Carter.

10/02/81 -- President Reagan announced his plan to "close the window of vulnerability," which called for placing the first 36 of 100 MX missiles in existing Titan silos and building 100 B-1 bombers.

09/09/81 -- None of the MX-basing possibilities being considered by the Administration is "without serious risks, high costs, important uncertainties, or significant drawbacks" according to a study by the Congressional Office of Technology Assissment. The report suggested that deploying the missiles on small submarines is the most technically feasible solution.

08/25/81 -- No land-based version of the MX can survive a Soviet attack without an anti-ballistic missile system, according to the Under Secretary of Defense for Research and Development. Richard Delauer said it is likely the Pentagon will hasten development of ballistic missile interceptors.

07/17/81 -- Marshal Ogarkov, Soviet armed forces chief of staff, indicated the Soviet Union has begun a buildup of strategic nuclear forces in response to "aggressive, militant" U.S. behavior.

03/16/81 -- Defense Secretary Weinberger named a 15-member panel to reevaluate MX basing options. The non-government experts are to report their findings to Weinberger July 1.

02/14/81 -- The U.S. Air Force recommends that production of a B-1 bomber variant begin production at an early date, and that development of a "Stealth" bomber be expedited.

01/28/81 -- Chairman of the Joint Chiefs of Staff, General David Jones, stressed the need for a new strategic bomber. "Deploying a new manned penetrator should be a top priority among the new strategic initiatives that we need to pursue," Jones stated to the Senate Armed Services Committee.

-- Secretary of Defense Weinberger has ordered a study on the feasibility of sea-basing the MX as an alternative to the racetrack mode favored by

the Carter Administration.

01/18/81 -- MX "must be the nation's highest priority" in the coming years to counter U.S. ICBM vulnerability, according to Strategic Air Command (SAC) commander General Richard Ellis. He said the increased yield and accuracy of Soviet ICBMs "have put our Minutemen at risk to the point where ...we could not respond effectively in a coherent manner."

01/06/81 -- Casper Weinberger, Secretary of Defense designate, speaking at confirmation hearings, said he "would want to examine a wide number of options" before approving a semi-mobile MX ICBM system.

11/10/80 -- Strategic nuclear weapons improvement is emphasized in a draft Defense Department budget prepared by advisors to President-elect Reagan. Provisions include: beginning immediate production of the B-1 bomber, with an initial procurement of 100 aircraft, accelerating the MX program, with full operational capability by FY86, improving the Minuteman force, accelerating conversion of B-52s to cruise missile carriers, accelerating Trident construction program to complete three boats per year rather than the current rate of one.

11/03/80 -- The Soviet Union is pre-flight testing two new ICBMs, Aviation Week & Space Technology reports. Both are solid fueled and "extremely accurate" according to U.S. intelligence officers. One is mobile.

08/22/80 -- "Technical problems" within the Department of Energy have caused delays in the production of several nuclear weapons, including Mark 12A warheads, planned to replace aging warheads on Minuteman III missiles. Also affected are an advanced nuclear warhead for the Army's Lance missile, and a new bomb to be deployed on B-52s.

-- Technology that can make U.S. aircraft "invisible" to radar, thus enabling them to penetrate Soviet air defenses, was announced by Secretary of Defense Brown. He asserted that "stealth" technology, which allows the United States to build undetectable manned and unmanned aircraft, "alters the military balance significantly."

08/21/80 -- The United States does not have enough strategic weapons to implement PD-59, according to Strategic Air Command (SAC) commander General Richard Ellis. "The principle of maintaining a countervailing strategy cannot be supported in the 1979-86 time period," Ellis wrote in a letter to Secretary of Defense Harold Brown.

07/25/80 -- A shift in strategic nuclear targeting policy, from mutual assured destruction (MAD) toward one of "flexible response," was approved by President Carter. PD-59, as the revision is known, stresses a range of U.S. retaliatory options against military targets, in addition

to massive retaliation against cities.

04/30/80 -- The Pentagon has withdrawn plans to base the MX on a "race-track," citing cost as the primary factor. New plans call for deploying the missiles in shelters in a straight line, instead of the previously planned closed-loop.

02/14/80 -- The Soviet Union has tested a new submarine-launched ballistic missile that can carry larger nuclear weapons than presently deployed SLBMs. Encrypted telemetry prevented U.S. experts from gauging its accuracy.

02/08/80 -- Senators Howard W. Cannon and Paul D. Laxalt of Nevada, together with Jake Garn and Orrin G. Hatch of Utah, formally asked President Carter to reconsider the MX racetrack basing mode. They prefer a system that "would be cheaper, more effective, and come on line quicker...."

01/30/80 -- National Intelligence Estimate (NIE) 1138-79 indicates that the Soviets could have 14,000 ICBM and SLBM warheads by 1989 if SALT II is not approved. The level would otherwise be limited to about 6,000 in 1985, when the pact, if approved, would expire.

01/29/80 -- Defense Secretary Brown estimates that Soviet SS-18 and SS-19 ICBMs will place U.S. second-strike minutemen in mortal peril by 1981 or 1982, using "a relatively small part of that force."

11/09/79 -- The Senate authorized appropriations for MX, but expressed reservations on the "racetrack" deployment recommended by the President.

09/07/79 -- President Carter announced that the MX will be deployed in a "racetrack" configuration. A projected cost of $33 billion will deploy 200 MX ICBMs among 4,600 horizontal shelters, situated in clusters connected by 23 closed loop roads.

08/03/79 -- CINCSAC estimates that better Soviet air defenses will reduce B-52 penetration probabilities to about 75% by 1985, even if all proposed U.S. improvements bear fruit.

07/09/79 -- Defense Secretary Harold Brown told the Senate Foreign Relations Committee that the impending vulnerability of America's Minuteman ICBMs in silos would persist even if the Soviets dismantled all of their SS-18 missiles.

06/01/78 -- Dr. William Perry, Under Secretary of Defense for Research and Engineering, stated the United States' cruise missile will be able to penetrate any Soviet air defense. "I believe we will be able to sustain the penetrability of the cruise missile in the

indefinite future under any set of defense responses I am able to conceive of."

08/02/78 -- Senator William Proxmire called the proposed Multiple Aiming Point (MAP) system "a strategic error of mammoth proportions," claiming that the Soviets could counter the MAP strategy at a fraction of the cost to the U.S. Proxmire says that advantage in throw weight and megatonnage could easily be converted into numbers of warheads to saturate U.S. sites.

07/25/78 -- In his first news conference as Chairman of the Joint Chiefs of Staff, Air Force General David C. Jones expressed his support for multiple aiming point (MAP) basing for mobile ICBMs, which he called essential to reducing vulnerability of U.S. land-based missiles.

06/30/78 -- As a result of an Air Force study reevaluating MX basing mode options, DOD preference for underground trenches has been replaced with the administration's preference for a method known as Multiple Aiming Point (MAP) basing, in which ICBM vulnerability would be reduced by deploying each missile in a field of up to 25 vertical shelters. Missiles would be shifted periodically and covertly among these soft silos at dispersed positions. The plan could be applied to Minuteman as well.

06/21/78 -- At the first public test of the Tomahawk air-launched cruise missile at White Sands, its performance against simulated defenses was termed "letter perfect."

07/05/77 -- Department of Defense announced that the Minuteman III production line will be shut down after the completion of the last ten missiles now under construction.

06/30/77 -- President Carter announced his decision to halt production of the B-1 bomber and to plan instead the deployment of air-launched cruise missiles with modernized B-52s.

06/02/77 -- Pentagon spokesman Thomas Ross amended White House contentions that Mark-12A warheads would give the United States a "temporary advantage," noting that even if they "were to work perfectly, we don't believe we would be able to knock out most of their Soviet silos because of our limited Minuteman force."

06/01/77 -- White House Press Secretary Powell stated that the deployment of the Mark-12A nuclear warhead would give the United States a "temporary advantage" over the Soviet strategic arsenal.

05/16/77 -- Soviet news weekly New Times warned that the cruise missile "was not a monopoly product of the USA," suggesting that U.S. deployment would be followed by Soviet deployment of cruise missiles.

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Table I

COMPLETE LIST OF OPTIONAL TRIADS

One hundred twenty triads are mathematically possible, with 10 functionally different delivery systems to choose from: Strategic bombers; air-launched cruise missiles (ALCMs); submarine-launched cruise missiles (SLCMs); fixed-site intercontinental ballistic missiles (ICBMs); semi-mobile ICBMs (SM ICBMs); freely-mobile ICBMs (FM ICBMs); air-launched ballistic missiles (ALBMs); submarine-launched ballistic missiles (SLBMs), including shallow water missile (SUM) variants; free-floating ballistic missiles launched from surface ships or submarines (Hydra); and ballistic missiles launched directly by surface ships (SSBMs).

All 120 groups are listed below, arranged by structural categories. Combinations that fit in more than one category are included only once to highlight key characteristics.

UNDUE DEPENDENCE ON AIRBREATHERS

Bombers Plus Air-Launched Missiles

1	2	3	4	5	6	7
Bomber	Bomber	Bomber	Bomber	Bomber	Bomber	Bomber
ALCM	ALCM	ALCM	ALCM	ALCM	ALCM	ALCM
SLCM	ALBM	ICBM	SLBM	SM ICBM	FM ICBM	Hydra
8	9	10	11	12	13	14
Bomber	Bomber	Bomber	Bomber	Bomber	Bomber	Bomber
ALCM	ALBM	ALBM	ALBM	ALBM	ALBM	ALBM
SSBM	ICBM	SLBM	SM ICBM	FM ICBM	Hydra	SSBM

Bombers Plus SLCMs

15	16	17	18	19	20	21
Bomber	Bomber	Bomber	Bomber	Bomber	Bomber	Bomber
SLCM	SLCM	SLCM	SLCM	SLCM	SLCM	SLCM
ALBM	ICBM	SLBM	SM ICBM	FM ICBM	Hydra	SSBM

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ALCMs Plus ALBMs or SLCMs

22	23	24	25	26	27	28	29
ALCM	ALCM	ALCM	ALCM	ALCM	ALCM	ALCM	ALCM
ALBM	ALBM	SLCM	SLCM	SLCM	SLCM	SLCM	SLCM
ICBM	SLBM	ICBM	SLBM	SM ICBM	FM ICBM	Hydra	SSBM

NOTHING BUT BALLISTIC MISSILES

30	31	32	33	34	35	36	37
ALBM	ALBM	ALBM	ALBM	ALBM	ALBM	ALBM	ALBM
ICBM	ICBM	ICBM	ICBM	ICBM	SLBM	SLBM	SLBM
SLBM	SM ICBM	FM ICBM	Hydra	SSBM	SM ICBM	FM ICBM	Hydra

38	39	40	41	42	43	44
ALBM	ALBM	ALBM	ALBM	ALBM	ALBM	ALBM
SLBM	SM ICBM	SM ICBM	SM ICBM	FM ICBM	FM ICBM	Hydra
SSBM	FM ICBM	Hydra	SSBM	Hydra	SSBM	SSBM

45	46	47	48	49	50
SLBM	SLBM	SLBM	SLBM	SLBM	SLBM
SM ICBM	SM ICBM	SM ICBM	FM ICBM	FM ICBM	Hydra
FM ICBM	Hydra	SSBM	Hydra	SSBM	SSBM

51	52	53	54	55	56	57
SM ICBM	SM ICBM	SM ICBM	FM ICBM	ICBM	ICBM	ICBM
FM ICBM	FM ICBM	Hydra	Hydra	SLBM	SLBM	SLBM
Hydra	SSBM	SSBM	SSBM	SM ICBM	FM ICBM	Hydra

58	59	60	61	62	63	64
ICBM	ICBM	ICBM	ICBM	ICBM	ICBM	ICBM
SLBM	SM ICBM	SM ICBM	SM ICBM	FM ICBM	FM ICBM	Hydra
SSBM	FM ICBM	Hydra	SSBM	Hydra	SSBM	SSBM

UNDUE DEPENDENCE, LAND-LAUNCHED MISSILES

65	66	67	68	69	70
ICBM	ICBM	ICBM	ICBM	ICBM	ICBM
SM ICBM	FM ICBM	SM ICBM	FM ICBM	SM ICBM	FM ICBM
Bomber	Bomber	ALCM	ALCM	SLCM	SLCM

71	72	73
SM ICBM	SM ICBM	SM ICBM
FM ICBM	FM ICBM	FM ICBM
Bomber	ALCM	SLCM

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UNDUE DEPENDENCE, SUBMARINE-LAUNCHED MISSILES

74	75	76	77	78	79
SLBM	SLBM	SLBM	SLBM	SLBM	SLBM
SLCM	SLCM	SLCM	SLCM	SLCM	SLCM
ICBM	SM ICBM	FM ICBM	Hydra	SSBM	ALBM

COMPLETE CHANGE TO PRESENT TRIAD

80	81	82	83	84
ALCM	ALCM	ALCM	ALCM	ALCM
SLCM	ALBM	ALBM	ALBM	ALBM
ALBM	SM ICBM	FM ICBM	Hydra	SSBM

85	86	87	88	89
ALCM	ALCM	ALCM	ALCM	ALCM
SM ICBM	FM ICBM	FM ICBM	Hydra	SM ICBM
SSBM	Hydra	SSBM	SSBM	Hydra

90	91	92	93	94
SLCM	SLCM	SLCM	SLCM	SLCM
ALBM	ALBM	ALBM	SM ICBM	SM ICBM
FM ICBM	Hydra	SSBM	Hydra	SSBM

95	96	97	98
SLCM	SLCM	SLCM	SLCM
FM ICBM	FM ICBM	Hydra	ALBM
Hydra	SSBM	SSBM	SM ICBM

BEST BALANCED STRUCTURES

Include Hard-Site ICBMs

99	100	101	102	103
ICBM	ICBM	ICBM	ICBM	ICBM
SLBM	Hydra	SSBM	SLBM	Hydra
Bomber	Bomber	Bomber	ALCM	ALCM

104	105	106	107
ICBM	ICBM	ICBM	ICBM
SSBM	SLCM	SLCM	SLCM
ALCM	ALBM	Hydra	SSBM

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Include Semi-Mobile ICBMs

108	109	110	111
SM ICBM	SM ICBM	SM ICBM	SM ICBM
SLBM	Hydra	SSBM	SLBM
Bomber	Bomber	Bomber	ALCM

Include Freely-Mobile ICBMs

112	113	114	115
FM ICBM	FM ICBM	FM ICBM	FM ICBM
SLBM	Hydra	SSBM	SLBM
Bomber	Bomber	Bomber	ALCM

Eliminate Land-Launched Missiles

116	117	118	119	120
SLBM	SLBM	SLBM	SLBM	Bomber
Bomber	Bomber	ALCM	ALCM	Hydra
SSBM	Hydra	SSBM	Hydra	SSBM